ANDREWS
ENGINEERING, INC.

September 9, 2011

Stephen F. Nightingale
Manager, Permit Section
Bureau of Land
Illinois Environmental Protection Agency
1021 North Grand Ave. East
P.O. Box 19276
Springfield, IL 62794-9276

Re: 2018080001 – Winnebago County
Winnebago Landfill
Permit No. 1991-138-LF
Addendum 1 to Log No. 2011-118

Dear Mr. Nightingale:

On behalf of Winnebago Landfill, submitted herein are an original and three copies of an addendum to Illinois EPA Log No. 2011-118. The original application provided an alternate source demonstration for confirmed fourth quarter 2010 exceedences. The application forms were provided in the original application submitted to the Illinois EPA on April 8, 2011.

As part of the alternate source demonstration, a well-specific intrawell value was proposed for specific conductance at southern unit well R22S. As outlined in the alternate source demonstration, R22S is an upgradient well and is not expected to be impacted by the facility. The concentrations of specific conductance at R22S represent natural fluctuation in the background groundwater quality. In discussions with the Illinois EPA regarding the original submittal, it was suggested that if it can be demonstrated that a change in background groundwater quality has occurred, then the site interwell value should be revised. Given the natural fluctuation of groundwater quality observed in upgradient well R22S, a revised interwell value for specific conductance at the southern unit is appropriate. A revised interwell value utilizing eight consecutive quarters of data (third quarter 2009 through second quarter 2011) from the southern unit upgradient wells (R11S, G11D, G13S, G13D, R22S, and R22D) is provided in Appendix A. The statistical method used is provided in Appendix B. The initial proposal to establish a well-specific intrawell value for R22S is withdrawn.

Please contact Tom Hilbert at (815) 963-7516 if you have any questions or require additional information.

Sincerely,

Teresa N. Sharp
Environmental Scientist

TNS:bjh:slm

Enclosure(s)

cc: Tom Hilbert – Rock River Environmental Services
Bernie Shorle – US EPA Region 5

J:\1990\90-114\DOC\2011\4Q10 ASD NS\Log No. 2011-118 Addendum No. 1.doc
Applications

APPENDIX A

Revised Interwell Value

Winnebago Landfill
Southern Unit
Interwell AGQS Statistics

Parameter	Units	3Q09	4Q09	1Q10	G11D 2Q10	3Q10	4Q10	1Q11	2Q11
Specific conductance	umhos/cm	454	487	593	654	757	712	656	432

Parameter	Units	3Q09	4Q09	1Q10	R11S 2Q10	3Q10	4Q10	1Q11	2Q11
Specific conductance	umhos/cm	462	482	575	652	1560	677	624	479

Parameter	Units	3Q09	4Q09	1Q10	G13D 2Q10	3Q10	4Q10	1Q11	2Q11
Specific conductance	umhos/cm	2,240	1,047	1,437	3,750	1,409	3,770	436	2,180

Parameter	Units	3Q09	4Q09	1Q10	G13S 2Q10	3Q10	4Q10	1Q11	2Q11
Specific conductance	umhos/cm	690	819	1,147	1,228	1,185	1,900	1,728	3,820

Parameter	Units	3Q09	4Q09	1Q10	G22D 2Q10	3Q10	4Q10	1Q11	2Q11
Specific conductance	umhos/cm	740	593	883	1,330	1,057	1,384	1124	516

Parameter	Units	3Q09	4Q09	1Q10	R22S 2Q10	3Q10	4Q10	1Q11	2Q11
Specific conductance	umhos/cm	749	938	1,571	3,200	1,209	3,210	3,330	745

Normal Distribution*	Nonparametric Upper Prediction Limit**
no	3,770

Notes:
*Shapiro-Wilk utilized to test for normality
**The maximum value was utilized as the nonparametric upper prediction limit

APPENDIX B

Statistical Method

Statistical Analyses Method

References:

1. 35 Illinois Administrative Code 811.320
2. Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance, USEPA, March 2009

Background quality shall be determined using the statistical techniques set forth in 35 IAC 811.320(e) and the facility permit. The data was tested for normality using the Shapiro-Wilk normality test. If the data was found not to follow a normal distribution, a nonparametric statistical method was utilized. The data was then examined for outliers. After the outlier test, the percentages of non-detect values (NDs) were calculated for each parameter to determine the applicable ND treatment method, if any. Upon completion of the treatment of non-detect values, the prediction limit for each parameter was calculated using the mean, standard deviation, and the appropriate t value. The statistical analysis uses a one-tailed test to determine an upper limit of significance. The upper prediction limit is the concentration for the probability that the constituent can be measured without constituting a statistical increase above the background. Any concentration found below this limit is regarded as falling within the normal statistical population.

Statistical Method

The statistical method employs either the 99% or 95% prediction limit in accordance with the facility permit. The prediction limit incorporates the mean, standard deviation, number of samples, and the Student's t value in the calculation to determine general background groundwater quality. An upper prediction limit is calculated for each individual chemical parameter. The well data from the site is evaluated statistically with samples collected during a minimum of four (4) consecutive quarters of background sampling.

Handling of Outliers

Prior to statistical analyses the data set was evaluated for outliers. Outliers are defined as data points that vary significantly from the mean value for that data set. Outliers may represent sampling error, contamination from surface run-off, analytical laboratory error, or anomalous site conditions. Outliers, if not removed from the data set, can erroneously

increase the AGQS and minimize the occurrence of an exceedences related to a release from a waste unit. Once a statistical outlier has been identified, the concentrations are evaluated to determine the cause. If a valid reason has been determined for the outlier, the data point will be removed from the data set. If no specific reason can be documented, the point will considered representative and included in the analysis. Statistical analysis will then be conducted as described below.

Handling of Non-Detects (NDs)

Non-detect values (NDs) were handled according to the percentage of Non-Detects (%ND) present in the background sampling. The %ND was calculated for each parameter from the pooled background data of each well set. The data treatment was done according to the following criteria:

a) For under 0% NDs, no adjustment is made to the values in the data set.

b) For under 15% NDs, the value of one-half (½) the reported Detection Limit (DL) was substituted for the ND value, and the mean and standard deviation were calculated using detected values with the substituted ND values.

c) For 15-50% NDs, Cohen's Adjustment was used to adjust the mean and standard deviation. The adjusted mean and standard deviation was then used to calculate the prediction limit.

d) For over 50% but not 100% NDs, the highest recorded concentration was substituted for the prediction limit.

e) For 100% NDs, the Practical Quantitation Limit (PQL) will be substituted for the ND value. The mean and standard deviation was calculated using the substituted ND values.

Prediction Limit

The statistical procedure was conducted according to the following steps:

1. Calculate arithmetic mean

The arithmetic mean was calculated using the pooled data for each parameter. The arithmetic mean (X_b) was calculated using the following equation:

$$X_b = \frac{X_1 + X_2 + \ldots + X_n}{n}$$

where: X_b = Average background value

X_n = Individual background value for *n* sample

n = Number of background values

2. Calculate standard deviation

The standard deviation was calculated using the pooled data for each parameter. The standard deviation was calculated using the following equation:

$$S_b = \sqrt{\frac{(X_1 - X_b) + (X_2 - X_b) + \ldots + (X_n - X_b)}{n-1}}$$

where: S_b = Population standard deviation
X_n = Individual background value for *n* sample
X_b = Mean (1)
n = Number of background samples

3. Calculate the Upper Prediction Limit

The Upper Prediction Limit was calculated for each parameter using the mean (1), the standard deviation (2), the number of background samples, and the Student's t value. The Student's t value σ, is determined by the facility permit whether it is σ = 0.01 (99% Confidence) or σ = 0.05 (95% Confidence). The Student's t value also varies upon the number of background samples utilized in the calculations. For those parameters with 15% to 50%% NDs, the Cohen Method was utilized to calculate the Prediction Limit. The methodology described in "Statistical Analysis of Ground-Water Monitoring Data at RCRA Facilities, Unified Guidance" was used to calculate the Cohen Prediction Limit. The Upper Prediction Limit for the remaining parameters was calculated using the following equation:

$$PL = X_b +\_ S_b \bullet t \bullet \sqrt{1 + \frac{1}{n}}$$

where: PL = Upper Prediction Limit (Upper and Lower for pH)
X_b = Mean (1)
S_b = Standard Deviation (2)
t = Student's t value at 0.01 or 0.05 significance
n = Number of background samples